

The Effect of Neighborhood Context on Cognitive Function in Individuals Approaching Midlife

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Study Supported by NIH grant AG046938

Neighborhoods and Cognition

- ▣ Neighborhoods are an important context for development^{1,2}
- ▣ Structural and demographic neighborhood characteristics associated with lower cognitive function
 - ▣ Lower neighborhood education, socioeconomic status, and greater deprivation → poorer cognitive performance³⁻⁶
- ▣ Self-reported appraisals of neighborhood problems
 - ▣ May activate a stress response and contribute to reduced cognition^{7,8}
 - ▣ Heightened senses of vigilance, alarm or threat⁹

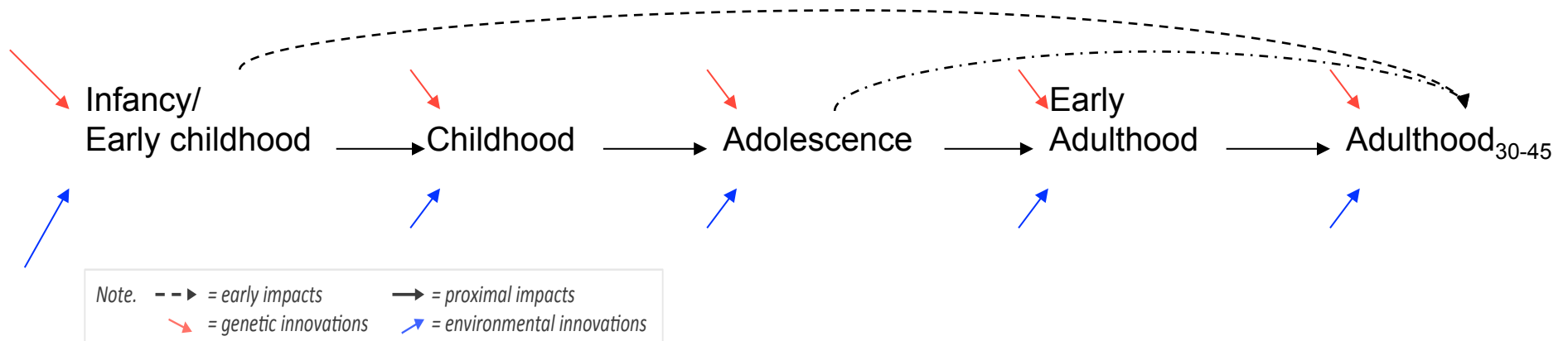
¹Baltes (1987); ²Sampson et al. (2002); ³Aneshensel et al. (2011); ⁴Lang et al. (2008); ⁵Wight et al. (2006); ⁶Zeki Al Hazzouri et al., 2011 ; ⁷Lazarus & Folkman (1984); ⁸Mujahid et al (2007); ⁹Augustin et al. (2008)

Current Study

- Simultaneously evaluate associations between subjective and objective neighborhood indicators
- Hypothesis: Greater reports of neighborhood problems will be association with lower cognitive function beyond objective neighborhood indicators

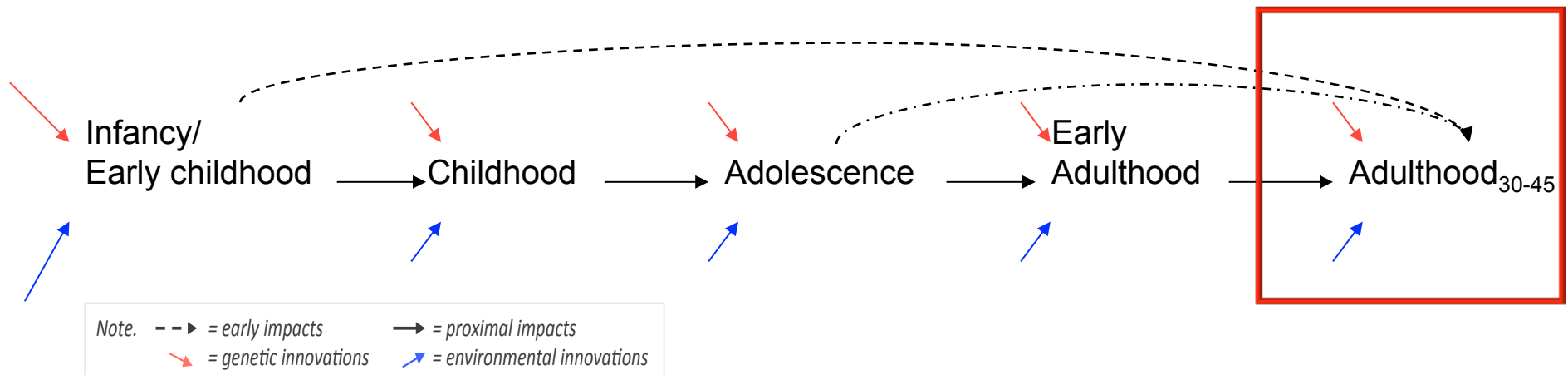
Analytic Sample

CATSLife: The **C**olorado **A**doption/**T**win **S**tudy of **L**ifespan Behavioral Development and Cognitive Aging



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- ▣ N= 657; 42.90% female
- ▣ Ages: (Mean= 33.23 , SD= 4.92; range 28 - 46)
- ▣ All participants in this analytic sample reside within the state of Colorado

Neighborhood Measures

Neighborhood Problems

- ▣ How big a problem do you think your neighborhood has with...
 - ▣ High unemployment?
 - ▣ Heavy vehicle traffic?
 - ▣ Abandoned houses?
 - ▣ Delinquent gangs?
 - ▣ Assaults or muggings?
 - ▣ +16 other problems

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Area Deprivation Index (ADI)

- ▣ Modified Singh's ADI¹⁰
 - ▣ % of population with < H.S. education
 - ▣ % with at least a H.S. diploma
 - ▣ % employed in white collar occupations
 - ▣ Median family income
 - ▣ Median home value
 - ▣ Median gross rent
 - ▣ % owner occupied houses
 - ▣ % unemployed
 - ▣ % single-parent households
 - ▣ % families below poverty level
 - ▣ % below 150% of poverty threshold
 - ▣ Income disparity

¹⁰Singh (2003)

Cognitive Function

- ▣ Specific cognitive abilities:
 - ▣ Spatial (card rotations; paper form board)
 - ▣ Verbal (vocabulary; things categories test)
 - ▣ Memory (picture memory; names and faces)
 - ▣ Speed (Colorado perceptual speed test; subtraction & multiplication test)

- ▣ Wechsler Adult Intelligence Scale---III (WAIS-III)¹¹
 - ▣ Full scale
 - ▣ Performance
 - ▣ Verbal

¹¹Wechsler (1993)

Results

- Neighborhood problems positively associated with ADI
- Neighborhood problems associated with lower spatial and speed scores

	1	2	3	4	5	6	7	8	9
1. Neighborhood problems	-								
2. ADI	0.17	-							
3. Spatial	-0.11	-0.04	-						
4. Verbal	0.00	-0.16	0.40	-					
5. Memory	0.01	-0.07	0.22	0.33	-				
6. Speed	-0.10	-0.09	0.42	0.54	0.27	-			
7. WAIS Total	-0.07	-0.14	0.58	0.70	0.34	0.53	-		
8. WAIS Verbal	-0.04	-0.14	0.41	0.70	0.27	0.48	0.91	-	
9. WAIS Performance	-0.07	-0.10	0.61	0.49	0.31	0.42	0.88	0.60	-

Results

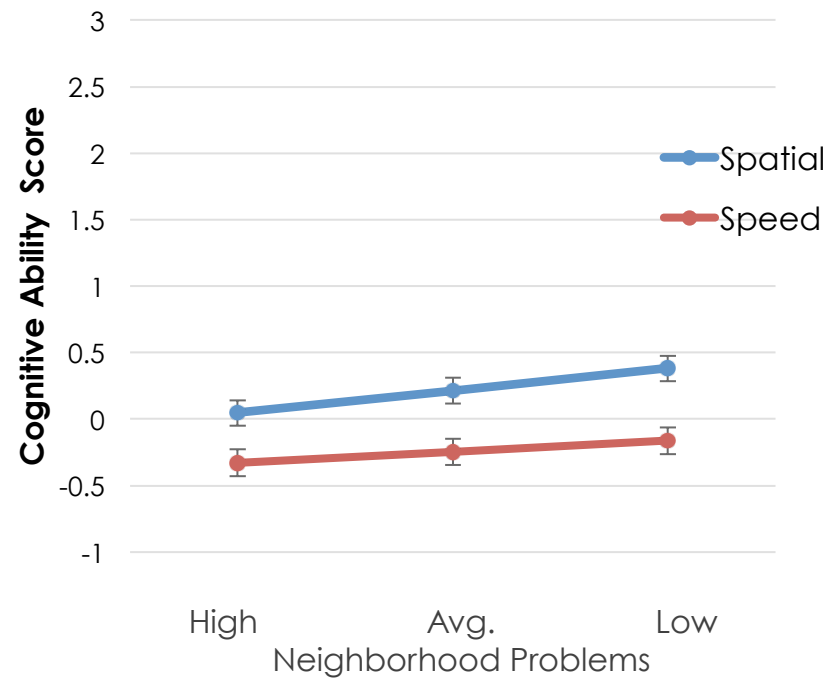
- ADI associated with lower verbal scores, WAIS total, and verbal and performance subscales

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Results

- Perceived neighborhood problems associated with lower spatial and speed scores

	SPATIAL	SPEED
Intercept	-0.09(0.08)	-0.02 (0.07)
Neigh. problems	-0.02 (0.01)	-0.01 (0.01)
ADI	0.02 (0.06)	-0.07(0.05)
Sex (Difference btw male & female)	0.25 (0.11)	-0.34 (0.10)
Age	0.00 (0.01)	0.04 (0.01)



Results

- Area Deprivation Index associated with lower performance in verbal domains

	VERBAL	WAIS Total	WAIS Verbal
Intercept	-0.16(0.08)	-0.06 (0.19)	0.02 (0.19)
Neigh. problems	-0.00 (0.0)	-0.01 (0.01)	-0.01 (0.01)
ADI	-0.14 (0.05)	-0.12 (0.05)	-0.13 (0.05)
Sex (Difference btw male & female)	-0.04 (0.11)	-0.08 (0.11)	-0.12 (0.11)
Age	0.05 (0.01)	0.04 (0.01)	0.03 (0.01)

Results

- Effects of ADI explained by education

	VERBAL	WAIS Total	WAIS Verbal
Intercept	-1.52 (0.24)	-1.61 (0.24)	-1.82 (0.23)
Neigh. problems	0.00 (0.01)	-0.00 (0.01)	-0.01 (0.01)
ADI	-0.09 (0.05)	-0.06 (0.05)	-0.07 (0.05)
Sex (Difference btw male & female)	0.03 (0.10)	0.76 (0.10)	0.21 (0.11)
Age	0.04 (0.01)	0.04 (0.01)	0.02 (0.01)
Education	0.08 (0.01)	0.08 (0.01)	0.10 (0.01)

Results

- Education reduces effect of perceived neighborhood problems
- Effect remains for spatial ability

	<u>SPATIAL</u>		<u>SPEED</u>	
Intercept	-0.09(0.08)	-0.74 (0.26)	-0.02 (0.07)	-0.99 (0.24)
Neigh. problems	-0.02 (0.01)	-0.01 (0.01)	-0.01 (0.01)	<i>-0.01 (0.00)⁺</i>
ADI	0.02 (0.06)	0.05 (0.06)	-0.07(0.05)	-0.03 (0.05)
Sex (Difference btw male & female)	0.25 (0.11)	0.29 (0.11)	-0.34 (0.10)	-0.28 (0.10)
Age	0.00 (0.01)	-0.00 (0.01)	0.04 (0.01)	0.04 (0.01)
Education		0.04 (0.02)		0.06 (0.01)

+ p = .056

Conclusion

- ▣ Subjective appraisals of neighborhoods have more robust effects on cognition than objective indicators
 - ▣ Consistent with recent work and extended to specific cognitive domains¹²
- ▣ Previous evidence employing objective measures might be confounded by education level
- ▣ Further research to examine mechanisms of the observed associations
 - ▣ Home environment (ambient hazards)¹²
 - ▣ Stress

CATSLife Team



Pictured on left. From left to right: Amy Ledbetter, Brett Haberstick, John DeFries, Liz Muñoz Diaz, Paige Trubenstein, Corinne Gunn, Chandra Reynolds, John Hewitt, Sally Wadsworth, Mike Stallings, Naomi Friedman, Robin Corley, Soo Rhee, Andy Smolen

Pictured below. From left to right: Saskia Selzam, Robert Plomin



Acknowledgments

NIH AG046938

[MPIs, Chandra A. Reynolds (Contact), Sally J. Wadsworth]

The content of this presentation is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

THANK YOU

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SUPPLEMENTAL

NEIGHBORHOOD PROBLEMS SCALE

How big a problem do you think your neighborhood has with...

- ...high unemployment?
- ...different racial or cultural groups that do not get along with each other?
- ...vandalism, and buildings and personal belongings being broken and torn up?
- ...little respect for rules, laws and authority?
- ...winos and junkies?
- ...prostitution?
- ...heavy vehicle traffic?
- ...abandoned houses?
- ...sexual assaults or rapes?
- ...burglaries and thefts?
- ...gambling?
- ...run down and poorly kept buildings and houses?
- ...syndicate, mafia, or organized crime?
- ...assaults and muggings?
- ...delinquent gangs?
- ...transients, street people, and homeless people?
- ...drug use or drug peddling in the open?
- ...transportation not available?
- ...medical services too far away?
- ...city officials ignoring problems?
- ...police not available when needed?

EDUCATION

- What is the highest year of school you have completed?

